

**Listing of Claims**

1. (Original) A method of managing a service, comprising the steps of:  
obtaining service quality requirements from a client;  
collecting quality data from a network; and  
comparing the collected quality data with the service quality requirements to  
determine if the service quality requirements are satisfied.
2. (Original) A method as recited in Claim 1, wherein the network comprises a  
plurality of network elements and the step of collecting quality data from the network  
comprises the steps of:  
querying at least one access network element for the quality data, the at least one  
access network element comprising those network elements of the plurality of network  
elements that are configured at an edge of the network and provide access to the network;  
saving the quality data in a repository;  
analyzing the quality data; and  
saving the analyzed quality data in the repository.
3. (Original) A method as recited in Claim 2, where the step of querying the at  
least one access network element for the quality data comprises the step of:  
querying at least one of the at least one access network element and a data collection  
agency for the quality data.
4. (Original) A method as recited in Claim 2, wherein the network comprises an  
asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at  
least one virtual channel (VC), wherein the at least one access network element comprises at  
least one network interface (NI), and wherein the step of analyzing the quality data comprises  
the step of:  
computing an availability measure for at least one of the VPN, the at least one VC,  
and the at least one NI.
5. (Original) A method as recited in Claim 4, wherein the availability measure of

the VPN is based on the availability measure of the at least one VC.

6. (Original) A method as recited in Claim 4, wherein the step of analyzing the quality data further comprises the steps of:

computing a mean time to restore (MTTR) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

computing a mean time between service outages (MTBSO) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

7. (Original) A method as recited in Claim 6, wherein the MTTR measure of the VPN and the MTBSO measure of the VPN are based on the MTTR measure of the at least one VC and the MTBSO measure of the at least one VC, respectively.

8. (Original) A method as recited in Claim 6, further comprising the steps of:  
receiving a service availability report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report comprising at least one of the availability measure, the MTTR measure, and the MTBSO measure for the at least one of the VPN, the at least one VC, and the at least one NI.

9. (Original) A method as recited in Claim 6, further comprising the steps of:  
associating an availability threshold with at least one of the VPN, the at least one VC, and the at least one NI; and

comparing the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated availability threshold.

10. (Original) A method as recited in Claim 9, further comprising the steps of:  
receiving a service availability report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report

comprising at least one of the availability measure, the MTTR measure, and the MTSBO measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the availability threshold that is associated with the at least one of the VPN, the at least one VC, and the at least one NI.

11. (Original) A method as recited in Claim 2, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the step of analyzing the quality data comprises the step of:

computing a bandwidth utilization measure for at least one of the VPN, the at least one VC, and the at least one NI.

12. (Original) A method as recited in Claim 11, wherein the bandwidth utilization measure of the VPN is based on the bandwidth utilization measure of the at least one VC.

13. (Original) A method as recited in Claim 11, further comprising the steps of:  
receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI.

14. (Original) A method as recited in Claim 11, further comprising the steps of:  
associating an over utilization threshold and an under utilization threshold with the at least one of the VPN, the at least one VC, and the at least one NI; and

comparing the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated over utilization threshold and under utilization threshold.

15. (Original) A method as recited in Claim 14, further comprising the steps of:  
receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and  
sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the over utilization threshold and under utilization threshold that are associated with the at least one of the VPN, the at least one VC, and the at least one NI.

16. (Original) A method as recited in Claim 2, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the step of analyzing the quality data comprises the step of:

computing a delay measure for at least one of the VPN, the at least one VC, and the at least one NI.

17. (Original) A method as recited in Claim 16, wherein the delay measure of the VPN is based on the delay measure of the at least one VC.

18. (Original) A method as recited in Claim 16, wherein the step of computing the delay measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises the steps of:

computing a cell delay variation (CDV) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

computing a round trip transfer delay (RTTD) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

19. (Original) A method as recited in Claim 18, further comprising the steps of:  
receiving a delay report request from the client for the at least one of the VPN, the at

least one VC, and the at least one NI; and

sending the requested delay report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested delay report comprising at least one of the CDV measure and the RTTD measure for the at least one of the VPN, the at least one VC, and the at least one NI.

20. (Original) A method as recited in Claim 2, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the step of analyzing the quality data comprises the step of:

computing an error measure for the at least one VC.

21. (Original) A method as recited in Claim 20, wherein the step of computing the error measure for the at least one VC comprises the steps of:

determining at least one of a number of lost cells, a number of misinserted cells, a number of discarded cells, a number of errored cells, and a number of cells that violate the service quality requirements from the client for the at least one VC; and

computing at least one of a cell loss ratio (CLR), a cell error ratio (CER), and a severely errored cell block ratio (SECBR) for the at least one VC.

22. (Original) A method as recited in Claim 21, further comprising the steps of:

receiving an error report request from the client for the at least one VC; and

sending the requested error report to the client for the at least one VC, the requested error report comprising at least one of the number of lost cells, the number of misinserted cells, the number of discarded cells, the number of errored cells, the number of cells that violate the service quality requirements from the client, the CLR, the CER, and the SECBR for the at least one VC.

23. (Original) A method as recited in Claim 2, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at

least one network interface (NI), and wherein the step of analyzing the quality data comprises the step of:

computing a fault measure for at least one of the VPN, the at least one VC, and the at least one NI.

24. (Original) A method as recited in Claim 23, wherein the step of computing the fault measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises the step of:

determining at least one of a number of errored seconds (ES), a number of severely errored seconds (SES), and a number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

25. (Original) A method as recited in Claim 24, further comprising the steps of: receiving a fault report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

sending the requested fault report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested fault report comprising at least one of the number of errored seconds (ES), the number of severely errored seconds (SES), and the number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

26. (Original) A method as recited in Claim 2, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the step of analyzing the quality data comprises the steps of:

defining a plurality of quality parameters for at least one of the VPN, the at least one VC, and the at least one NI;

obtaining a plurality of configured values, a respective one of which being associated with a respective one of the plurality of quality parameters;

computing a plurality of quality measures, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the

plurality of configured values;

comparing the respective one of the plurality of quality measures with the respective one of the plurality of configured values to determine a plurality of differences therebetween;

computing a plurality of numerical grades, a respective one of which being based on a respective one of the plurality of differences; and

summing the plurality of numerical grades to determine a quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

27. (Original) A method as recited in Claim 26, further comprising the step of:  
defining a plurality of threshold ranges, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the plurality of configured values; and

comparing the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

28. (Original) A method as recited in Claim 27, wherein the step of computing the plurality of numerical grades, the respective one of which being based on the respective one of the plurality of differences comprises the step of:  
computing the plurality of numerical grades, the respective one of which being based on the comparison of the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

29. (Original) A method as recited in Claim 26, further comprising the steps of:  
obtaining a plurality of weight coefficients, a respective one of which being associated with the respective one of the plurality of quality parameters; and  
multiplying the respective one of the plurality of numerical grades by the respective one of the plurality of weight coefficients prior to the step of summing the plurality of numerical grades to determine the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

30. (Original) A method as recited in Claim 26, wherein the plurality of weight coefficients are obtained from the client.

31. (Original) A method as recited in Claim 26, further comprising the step of:  
determining a qualitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI based on the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

32. (Original) A method as recited in Claim 26, wherein the quantitative quality appraisal of the VPN is based on the quantitative quality appraisal of the at least one VC.

33. (Original) A method as recited in Claim 26, wherein the plurality of configured values are obtained from the client.

34. (Original) A method as recited in Claim 26, wherein the plurality of quality parameters are associated with an ATM quality of service class selected from the group of service classes consisting of a constant bit rate (CBR) class, a real time variable bit rate (RT-VBR) class, a non-real time variable bit rate (NRT-VBR) class, an unspecified bit rate (UBR) class, and an available bit rate (ABR) class.

35 - 45. (Canceled)

46. (Original) A system for managing a service, comprising:  
means for obtaining service quality requirements from a client;  
means for collecting quality data from a network; and  
means for comparing the collected quality data with the service quality requirements to determine if the service quality requirements are satisfied.

47. (Original) A system as recited in Claim 46, wherein the network comprises a plurality of network elements and the means for collecting quality data from the network comprises:

means for querying at least one access network element for the quality data, the at least one access network element comprising those network elements of the plurality of network elements that are configured at an edge of the network and provide access to the



network;

means for saving the quality data in a repository;

means for analyzing the quality data; and

means for saving the analyzed quality data in the repository.

48. (Original) A system as recited in Claim 47, where the means for querying the at least one access network element for the quality data comprises:

means for querying at least one of the at least one access network element and a data collection agency for the quality data.

49. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for computing an availability measure for at least one of the VPN, the at least one VC, and the at least one NI.

50. (Original) A system as recited in Claim 49, wherein the availability measure of the VPN is based on the availability measure of the at least one VC.

51. (Original) A system as recited in Claim 49, wherein the means for analyzing the quality data further comprises:

means for computing a mean time to restore (MTTR) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for computing a mean time between service outages (MTBSO) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

52. (Original) A system as recited in Claim 51, wherein the MTTR measure of the VPN and the MTBSO measure of the VPN are based on the MTTR measure of the at least one VC and the MTBSO measure of the at least one VC, respectively.

53. (Original) A system as recited in Claim 51, further comprising:

means for receiving a service availability report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report comprising at least one of the availability measure, the MTTR measure, and the MTSBO measure for the at least one of the VPN, the at least one VC, and the at least one NI.

54. (Original) A system as recited in Claim 51, further comprising:

means for associating an availability threshold with at least one of the VPN, the at least one VC, and the at least one NI; and

means for comparing the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated availability threshold.

55. (Original) A system as recited in Claim 54, further comprising:

means for receiving a service availability report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report comprising at least one of the availability measure, the MTTR measure, and the MTSBO measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the availability threshold that is associated with the at least one of the VPN, the at least one VC, and the at least one NI.

56. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for computing a bandwidth utilization measure for at least one of the VPN, the at least one VC, and the at least one NI.

57. (Original) A system as recited in Claim 56, wherein the bandwidth utilization measure of the VPN is based on the bandwidth utilization measure of the at least one VC.

58. (Original) A system as recited in Claim 56, further comprising:  
means for receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and  
means for sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI.

59. (Original) A system as recited in Claim 56, further comprising:  
means for associating an over utilization threshold and an under utilization threshold with the at least one of the VPN, the at least one VC, and the at least one NI; and  
means for comparing the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated over utilization threshold and under utilization threshold.

60. (Original) A system as recited in Claim 59, further comprising:  
means for receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and  
means for sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the over utilization threshold and under utilization threshold that are associated with the at least one of the VPN, the at least one VC, and the at least one NI.

61. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at

least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for computing a delay measure for at least one of the VPN, the at least one VC, and the at least one NI.

62. (Original) A system as recited in Claim 61, wherein the delay measure of the VPN is based on the delay measure of the at least one VC.

63. (Original) A system as recited in Claim 61, wherein the means for computing the delay measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises:

means for computing a cell delay variation (CDV) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for computing a round trip transfer delay (RTTD) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

64. (Original) A system as recited in Claim 63, further comprising:

means for receiving a delay report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for sending the requested delay report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested delay report comprising at least one of the CDV measure and the RTTD measure for the at least one of the VPN, the at least one VC, and the at least one NI.

65. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for computing an error measure for the at least one VC.

66. (Original) A system as recited in Claim 65, wherein the means for computing the error measure for the at least one VC comprises:

means for determining at least one of a number of lost cells, a number of misinserted cells, a number of discarded cells, a number of errored cells, and a number of cells that violate the service quality requirements from the client for the at least one VC; and

means for computing at least one of a cell loss ratio (CLR), a cell error ratio (CER), and a severely errored cell block ratio (SECBR) for the at least one VC.

67. (Original) A system as recited in Claim 66, further comprising:

means for receiving an error report request from the client for the at least one VC; and

means for sending the requested error report to the client for the at least one VC, the requested error report comprising at least one of the number of lost cells, the number of misinserted cells, the number of discarded cells, the number of errored cells, the number of cells that violate the service quality requirements from the client, the CLR, the CER, and the SECBR for the at least one VC.

68. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for computing a fault measure for at least one of the VPN, the at least one VC, and the at least one NI.

69. (Original) A system as recited in Claim 68, wherein the means for computing the fault measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises:

means for determining at least one of a number of errored seconds (ES), a number of severely errored seconds (SES), and a number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

70. (Original) A system as recited in Claim 69, further comprising:

means for receiving a fault report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

means for sending the requested fault report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested fault report comprising at least one of the number of errored seconds (ES), the number of severely errored seconds (SES), and the number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

71. (Original) A system as recited in Claim 47, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the means for analyzing the quality data comprises:

means for defining a plurality of quality parameters for at least one of the VPN, the at least one VC, and the at least one NI;

means for obtaining a plurality of configured values, a respective one of which being associated with a respective one of the plurality of quality parameters;

means for computing a plurality of quality measures, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the plurality of configured values;

means for comparing the respective one of the plurality of quality measures with the respective one of the plurality of configured values to determine a plurality of differences therebetween;

means for computing a plurality of numerical grades, a respective one of which being based on a respective one of the plurality of differences; and

means for summing the plurality of numerical grades to determine a quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

72. (Original) A system as recited in Claim 71, further comprising:

means for defining a plurality of threshold ranges, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the plurality of configured values; and

means for comparing the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

73. (Original) A system as recited in Claim 72, wherein the means for computing the plurality of numerical grades, the respective one of which being based on the respective one of the plurality of differences comprises:

means for computing the plurality of numerical grades, the respective one of which being based on the comparison of the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

74. (Original) A system as recited in Claim 71, further comprising:

means for obtaining a plurality of weight coefficients, a respective one of which being associated with the respective one of the plurality of quality parameters; and

means for multiplying the respective one of the plurality of numerical grades by the respective one of the plurality of weight coefficients, the means for summing the plurality of numerical grades to determine the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI being responsive to the means for multiplying the respective one of the plurality of numerical grades by the respective one of the plurality of weight coefficients.

75. (Original) A system as recited in Claim 71, wherein the plurality of weight coefficients are obtained from the client.

76. (Original) A system as recited in Claim 71, further comprising:

means for determining a qualitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI based on the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

77. (Original) A system as recited in Claim 71, wherein the quantitative quality appraisal of the VPN is based on the quantitative quality appraisal of the at least one VC.

78. (Original) A system as recited in Claim 71, wherein the plurality of configured

values are obtained from the client.

79. (Original) A system as recited in Claim 71, wherein the plurality of quality parameters are associated with an ATM quality of service class selected from the group of service classes consisting of a constant bit rate (CBR) class, a real time variable bit rate (RT-VBR) class, a non-real time variable bit rate (NRT-VBR) class, an unspecified bit rate (UBR) class, and an available bit rate (ABR) class.

80 - 90. (Canceled)

91. (Original) A computer program product for managing a service, comprising:  
a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

computer readable program code for obtaining service quality requirements from a client;

computer readable program code for collecting quality data from a network;  
and

computer readable program code for comparing the collected quality data with the service quality requirements to determine if the service quality requirements are satisfied.

92. (Original) A computer program product as recited in Claim 91, wherein the network comprises a plurality of network elements and the computer readable program code for collecting quality data from the network comprises:

computer readable program code for querying at least one access network element for the quality data, the at least one access network element comprising those network elements of the plurality of network elements that are configured at an edge of the network and provide access to the network;

computer readable program code for saving the quality data in a repository;

computer readable program code for analyzing the quality data; and

computer readable program code for saving the analyzed quality data in the repository.



93. (Original) A computer program product as recited in Claim 92, where the computer readable program code for querying the at least one access network element for the quality data comprises:

computer readable program code for querying at least one of the at least one access network element and a data collection agency for the quality data.

94. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for computing an availability measure for at least one of the VPN, the at least one VC, and the at least one NI.

95. (Original) A computer program product as recited in Claim 94, wherein the availability measure of the VPN is based on the availability measure of the at least one VC.

96. (Original) A computer program product as recited in Claim 94, wherein the computer readable program code for analyzing the quality data further comprises:

computer readable program code for computing a mean time to restore (MTTR) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for computing a mean time between service outages (MTBSO) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

97. (Original) A computer program product as recited in Claim 96, wherein the MTTR measure of the VPN and the MTBSO measure of the VPN are based on the MTTR measure of the at least one VC and the MTBSO measure of the at least one VC, respectively.

98. (Original) A computer program product as recited in Claim 96, further comprising:

computer readable program code for receiving a service availability report request

from the client for the at least one of the VPN, the at least one VC, and the at least one NI;  
and

computer readable program code for sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report comprising at least one of the availability measure, the MTTR measure, and the MTSBO measure for the at least one of the VPN, the at least one VC, and the at least one NI.

99. (Original) A computer program product as recited in Claim 96, further comprising:

computer readable program code for associating an availability threshold with at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for comparing the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated availability threshold.

100. (Original) A computer program product as recited in Claim 99, further comprising:

computer readable program code for receiving a service availability report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI;  
and

computer readable program code for sending the requested service availability report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested service availability report comprising at least one of the availability measure, the MTTR measure, and the MTSBO measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the availability measure for the at least one of the VPN, the at least one VC, and the at least one NI with the availability threshold that is associated with the at least one of the VPN, the at least one VC, and the at least one NI.

101. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network

element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for computing a bandwidth utilization measure for at least one of the VPN, the at least one VC, and the at least one NI.

102. (Original) A computer program product as recited in Claim 101, wherein the bandwidth utilization measure of the VPN is based on the bandwidth utilization measure of the at least one VC.

103. (Original) A computer program product as recited in Claim 101, further comprising:

computer readable program code for receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI.

104. (Original) A computer program product as recited in Claim 101, further comprising:

computer readable program code for associating an over utilization threshold and an under utilization threshold with the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for comparing the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the respectively associated over utilization threshold and under utilization threshold.

105. (Original) A computer program product as recited in Claim 104, further comprising:

computer readable program code for receiving a bandwidth utilization report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI;

and

computer readable program code for sending the requested bandwidth utilization report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested bandwidth utilization report comprising the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI and a comparison of the bandwidth utilization measure for the at least one of the VPN, the at least one VC, and the at least one NI with the over utilization threshold and under utilization threshold that are associated with the at least one of the VPN, the at least one VC, and the at least one NI.

106. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for computing a delay measure for at least one of the VPN, the at least one VC, and the at least one NI.

107. (Original) A computer program product as recited in Claim 106, wherein the delay measure of the VPN is based on the delay measure of the at least one VC.

108. (Original) A computer program product as recited in Claim 106, wherein the computer readable program code for computing the delay measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises:

computer readable program code for computing a cell delay variation (CDV) measure for the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for computing a round trip transfer delay (RTTD) measure for the at least one of the VPN, the at least one VC, and the at least one NI.

109. (Original) A computer program product as recited in Claim 108, further comprising:

computer readable program code for receiving a delay report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for sending the requested delay report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested delay report comprising at least one of the CDV measure and the RTTD measure for the at least one of the VPN, the at least one VC, and the at least one NI.

110. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for computing an error measure for the at least one VC.

111. (Original) A computer program product as recited in Claim 110, wherein the computer readable program code for computing the error measure for the at least one VC comprises:

computer readable program code for determining at least one of a number of lost cells, a number of misinserted cells, a number of discarded cells, a number of errored cells, and a number of cells that violate the service quality requirements from the client for the at least one VC; and

computer readable program code for computing at least one of a cell loss ratio (CLR), a cell error ratio (CER), and a severely errored cell block ratio (SECBR) for the at least one VC.

112. (Original) A computer program product as recited in Claim 111, further comprising:

computer readable program code for receiving an error report request from the client for the at least one VC; and

computer readable program code for sending the requested error report to the client for the at least one VC, the requested error report comprising at least one of the number of lost cells, the number of misinserted cells, the number of discarded cells, the number of errored cells, the number of cells that violate the service quality requirements from the client,

the CLR, the CER, and the SECBR for the at least one VC.

113. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for computing a fault measure for at least one of the VPN, the at least one VC, and the at least one NI.

114. (Original) A computer program product as recited in Claim 113, wherein the computer readable program code for computing the fault measure for the at least one of the VPN, the at least one VC, and the at least one NI comprises:

computer readable program code for determining at least one of a number of errored seconds (ES), a number of severely errored seconds (SES), and a number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

115. (Original) A computer program product as recited in Claim 114, further comprising:

computer readable program code for receiving a fault report request from the client for the at least one of the VPN, the at least one VC, and the at least one NI; and

computer readable program code for sending the requested fault report to the client for the at least one of the VPN, the at least one VC, and the at least one NI, the requested fault report comprising at least one of the number of errored seconds (ES), the number of severely errored seconds (SES), and the number of unavailable seconds (UAS) for the at least one of the VPN, the at least one VC, and the at least one NI.

116. (Original) A computer program product as recited in Claim 92, wherein the network comprises an asynchronous transfer mode (ATM) virtual private network (VPN), the VPN comprising at least one virtual channel (VC), wherein the at least one access network element comprises at least one network interface (NI), and wherein the computer readable program code for analyzing the quality data comprises:

computer readable program code for defining a plurality of quality parameters for at least one of the VPN, the at least one VC, and the at least one NI;

computer readable program code for obtaining a plurality of configured values, a respective one of which being associated with a respective one of the plurality of quality parameters;

computer readable program code for computing a plurality of quality measures, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the plurality of configured values;

computer readable program code for comparing the respective one of the plurality of quality measures with the respective one of the plurality of configured values to determine a plurality of differences therebetween;

computer readable program code for computing a plurality of numerical grades, a respective one of which being based on a respective one of the plurality of differences; and

computer readable program code for summing the plurality of numerical grades to determine a quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

117. (Original) A computer program product as recited in Claim 116, further comprising:

computer readable program code for defining a plurality of threshold ranges, a respective one of which being associated with the respective one of the plurality of quality parameters and the respective one of the plurality of configured values; and

computer readable program code for comparing the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

118. (Original) A computer program product as recited in Claim 117, wherein the computer readable program code for computing the plurality of numerical grades, the respective one of which being based on the respective one of the plurality of differences comprises:

computer readable program code for computing the plurality of numerical grades, the respective one of which being based on the comparison of the respective one of the plurality of differences with the respective one of the plurality of threshold ranges.

119. (Original) A computer program product as recited in Claim 116, further comprising:

computer readable program code for obtaining a plurality of weight coefficients, a respective one of which being associated with the respective one of the plurality of quality parameters; and

computer readable program code for multiplying the respective one of the plurality of numerical grades by the respective one of the plurality of weight coefficients, the computer readable program code for summing the plurality of numerical grades to determine the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI being responsive to the computer readable program code for multiplying the respective one of the plurality of numerical grades by the respective one of the plurality of weight coefficients.

120. (Original) A computer program product as recited in Claim 116, wherein the plurality of weight coefficients are obtained from the client.

121. (Original) A computer program product as recited in Claim 116, further comprising:

computer readable program code for determining a qualitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI based on the quantitative quality appraisal of the at least one of the VPN, the at least one VC, and the at least one NI.

122. (Original) A computer program product as recited in Claim 116, wherein the quantitative quality appraisal of the VPN is based on the quantitative quality appraisal of the at least one VC.

123. (Original) A computer program product as recited in Claim 116, wherein the plurality of configured values are obtained from the client.

124. (Original) A computer program product as recited in Claim 116, wherein the plurality of quality parameters are associated with an ATM quality of service class selected



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from the group of service classes consisting of a constant bit rate (CBR) class, a real time variable bit rate (RT-VBR) class, a non-real time variable bit rate (NRT-VBR) class, an unspecified bit rate (UBR) class, and an available bit rate (ABR) class.

125 - 135. (Canceled)